Coil Breakage during Aneurysm Embolization
Case Report

O-K. KWON, K. JAE LEE, M. HEE HAN *, Y.-C. KO

Neurovascular Center, Inje University, Seoul Paik Hospital,
**Department of Radiology, Seoul National University Hospital*

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Summary

Stretched Guglielmi detachable coils (GDCs; Boston Scientific, USA) can be easily broken if forceful manipulation is applied. However, coil fracture without stretching has not been known. We report an extremely unusual occurrence of fracture without coil stretching during aneurysm embolization.

Introduction

Characteristics of Guglielmi detachable coils (GDCs; Boston Scientific, USA) including atraumatic design and retrievability have allowed safe deposition even in acutely ruptured aneurysms [1] and endovascular treatment of intracranial aneurysms has become a promising alternative to surgical clipping. However, like other therapeutic techniques, it has potential complications. Stretching and fracture of the GDC is one of them [2,3]. Due to its design, GDC can be easily stretched and the stretched coil can be broken if forceful manipulation is applied. The broken fragments may induce thromboembolic complications. However, coil fracture without stretching has not been known. We report an extremely unusual occurrence of fracture without coil stretching during aneurysm embolization.

Case Report

A 56-year-old woman was referred to our hospital for endovascular treatment of an incidentally found aneurysm. Angiograms revealed a small-sized bilobulating aneurysm in the right posterior communicating artery (figure 1). Under a general anesthesia, a 6 Fr-guide catheter was placed and the aneurysm was selected with a microcatheter (Excel-14; Boston Scientific, USA). First, the superiorly located lobe of the aneurysm was occluded, thereafter, occlusion of the inferiorly located lobe was tried. Initially, a GDC-10 (2 mm x 4 cm soft stretch resistant (SR) coil) was placed and detached without incident. Because the aneurysm was not completely occluded, another GDC-10 (2 mm x 4 cm soft SR) was advanced into the aneurysm. When about 2 cm of the coil was inserted, we found that the coil was placed superficially within the aneurysm, so the coil was carefully retrieved. But as soon as the coil was retrieved, a strange feeding like 'depressurization' or 'detachment' was sensed. No forceful manipulation or torque had been applied during insertion and retrieval. After confirming the coil fracture, the proximal part of the broken coil with delivery wire was removed (figure 2). The distal part of the coil stayed within the aneurysm with several millimeters protrusion

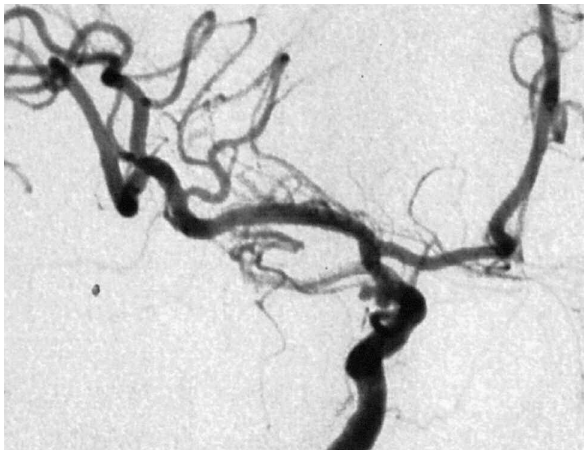

Figure 1 Initial angiogram showing a right posterior communicating artery aneurysm.

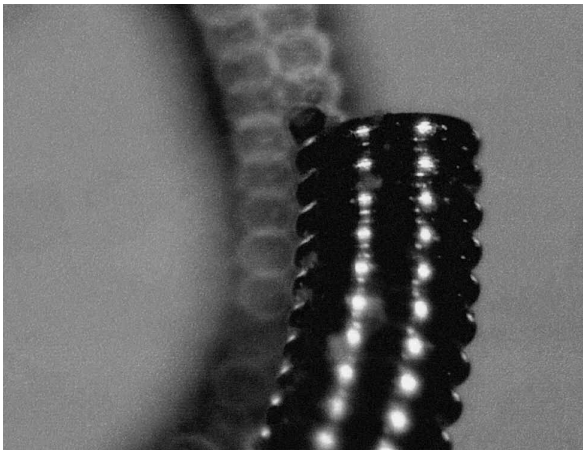

Figure 2 Photograph of the fractured coil. Coarse surface of the exact fracture site is seen. Note no coil stretching is found near the fracture site.

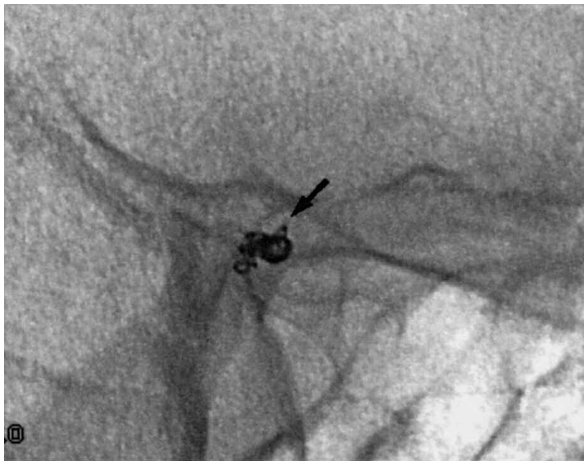

Figure 3 Fluoroscopic image demonstrating protrusion of the distal part of the fractured coil (arrow).

into the parent artery (figure 3). Thrombi developed in the parent artery around the aneurysm neck (figure 4), but was successfully resolved by intravenous heparin injection and intra-arterial use of urokinase and abxicimab (figure 5).

Discussion

The primary coil of GDC is constructed by winding a thin strand made of platinum alloy. Due to this design, the coil can be easily stretched and the stretched coil can be broken if forceful manipulation is given. However, coil stretching and breakage of the stretched coil may not produce serious complications because of its small diameter; the diameter of

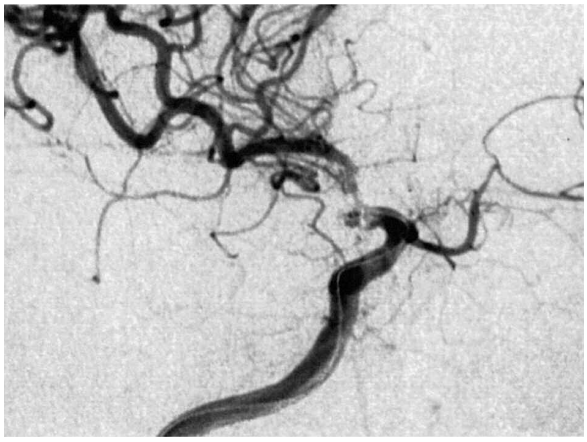

Figure 4 Angiogram showing parent artery thrombosis around the aneurysm neck after coil fracture.

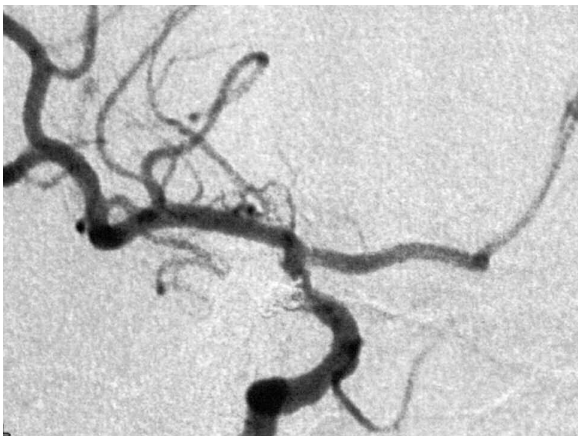

Figure 5 Angiogram showing patent internal carotid artery after thrombolysis and antiplatelet therapy.

GDC 10-Soft is 0.045 mm. In addition, if interventionists detect the coil stretching, he or she can usually control the situation [2,3].

However, GDC breakage without stretching is a different situation. It means that GDC can be fractured in unexpected situations even by usual techniques. And it means that it may occur when the coil is in a parent artery as well as within an aneurysm. One cannot imagine what will happen if the coil is broken during intracranial aneurysm embolization. It may produce a catastrophe.

We believe that the coil breakage in our case was caused by a defect of the raw material, that is, a defect of the platinum alloy itself. Interventionists do not have tools for examining the reliability of the raw material. We believe that our case is extremely unusual and it should be.

References

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O-Ki Kwon, M.D.
Neurovascular Center,
Inje University
Seoul Paik Hospital
Korea